We Claim:

1. A fiber optic pressure sensor comprising a body, at least one pair of optical fibers mounted in the body, said pair of optical fibers terminating at tips, a diaphragm mounted on the body to form an enclosed volume with the body, said diaphragm having an underside facing the volume, and said tips in optical communication with the underside,

at least a portion of the underside having a permanently concave curved surface, said curved surface being reflective and juxtaposed to reflect light emitted from the tip of one fiber to the tip of the other fiber.

2. The sensor of claim 1 wherein the light reflected is maximized when the pressure differential across the diaphragm is a minimum.

3. The sensor of claim 1 wherein movement of the diaphragm toward the tips reduces the light received by the tip of the other fiber.

4. The sensor of claim 1 wherein the curved surface is ellipsoidal.

5. The sensor of claim 1 wherein the curved surface is spherical.

6. The sensor of claim 1 wherein a thin film is applied to the curved surface to provide the reflectivity, said thin film having a coefficient of reflectivity that decreases with increasing temperature.

7. The sensor of claim 1 wherein the pair of optical fibers are bonded together along a common interface with each optical fiber comprising a core and a cladding, the cladding being decreased in thickness at the common interface relative to cladding lacking the common interface.

8. The sensor of claim 1 including temperature sensing means mounted in the body.

9. The sensor of claim 1 including a second pair of optical fibers mounted in the body, said second pair of optical fibers terminating at tips, said tips in optical communication with a non-deflecting reflective surface.

10. The sensor of claim 1 including a second pair of optical fibers mounted in the body, said second pair of optical fibers terminating at a second pair of tips, said second pair of tips in optical communication with the volume at a distance from the reflective curved surface different from the tips of the one pair of optical fibers.

11. A fiber optic pair comprising two optical fibers each having a core and cladding, said optical fibers being bonded together along a common interface with the axes of the fibers in parallel relationship, and the cladding of each fiber being decreased in thickness at the interface relative to cladding lacking the common interface.

12. An internal combustion engine fuel injector having a fuel chamber therein, a fiber optic fuel pressure sensor in the injector, said fiber optic fuel pressure

sensor including a diaphragm, the diaphragm being positioned for direct contact with fuel in the fuel chamber.

13. The fuel injector of claim 12 wherein the sensor includes a diaphragm, the diaphragm being in communication with the fuel chamber.

14. An internal combustion engine fuel injector having a fuel chamber therein, a channel formed in the fuel-injector separate from the fuel chamber, said channel open to an engine combustion chamber upon installation of the injector and a fiber optic combustion pressure sensor in said channel.

15. The fuel injector of claim 14 wherein the combustion pressure sensor includes a diaphragm, the diaphragm being in communication with the channel and combustion chamber.

16. The fuel injector of claim 12 including a channel formed in the injector, said channel open to an engine combustion chamber upon installation of the injector and a fiber optic combustion pressure sensor in said channel.

17. An internal combustion engine fuel injector having a fuel chamber therein, a fiber optic fuel pressure sensor in the injector, said fiber optic fuel pressure sensor in communication with the fuel chamber, a channel formed in the injector, said channel open to an engine combustion chamber upon installation of the injector and a fiber optic combustion pressure sensor in said channel,

temperature sensing means mounted in at least one pressure sensor,

circuit means in opto-electronic communication with the sensor having the temperature sensing means therein, said circuit means including means to inject light into the at least one pressure sensor, means to detect light arriving from the at least one pressure sensor and provide a response thereto and means to detect and respond to temperature induced changes in the temperature sensing means,

means to combine the responses to the light detected and temperature induced changes and in response thereto to provide an output corrected for the temperature induced changes..

18. The fuel injector of claim 20 wherein said circuit means in response to the output corrected for temperature induced changes adjusts the means to inject light into the at least one pressure sensor.

19. The fuel injector of claim 12 including circuit means in opto-electronic communication with at least one pressure sensor, said circuit means including means to inject light into the at least one pressure sensor, means to detect light arriving from the at least one pressure sensor and provide a response thereto,

and means actuated by an external trigger to adjust the means to inject light into the at least one pressure sensor.

20. The fuel injector of claim 14 including circuit means in opto-electronic communication with at least one pressure sensor, said circuit means

including means to inject light into the at least one pressure sensor, means to detect light arriving from the at least one pressure sensor and provide a response thereto,

and means actuated by an external trigger to adjust the means to inject light into the at least one pressure sensor.

21. The fuel injector of claim 16 including circuit means in opto-electronic communication with at least one pressure sensor, said circuit means including means to inject light into the at least one pressure sensor, means to detect light arriving from the at least one pressure sensor and provide a response thereto,

and means actuated by an external trigger to adjust the means to inject light into the at least one pressure sensor.

22. An internal combustion engine fuel injector having a fuel chamber therein, a fiber optic fuel pressure sensor in the injector, said fiber optic fuel pressure sensor in communication with the fuel chamber, a channel formed in the injector, said channel open to an engine combustion chamber upon installation of the injector and a fiber optic combustion pressure sensor in said channel,

wherein at least one pressure sensor includes two pairs of optical fibers and a diaphragm, both said pair of optical fibers having tips in optical reflective communication with the diaphragm,

the tip of one pair of optical fibers spaced from the diaphragm at a distance different from the tip of the other pair of optical fibers.

23. The fuel injector of claim 22 wherein each pair of optical fibers is mounted in a separate ferrule.

24. The fuel injector of claim 22 wherein both pairs of optical fibers are mounted in the same ferrule.

25. The fuel injector of claim 22 wherein the diaphragm has an underside, at least a portion of the underside comprising a reflective surface, whereby movement of the diaphragm nearer to both tips causes the light output of the nearest tip to the diaphragm to decrease and the light output of the furthest tip to increase.

26. The fuel injector of claim 25 including circuit means in opto-electronic communication with the at least one pressure sensor having two pairs of optical fibers, said circuit means including means to inject light into one fiber of each pair of optical fibers, means to detect light arriving from the other fiber of each pair of optical fibers and provide responses thereto,

whereby the response corresponding to the tip furthest from the diaphragm is caused to adjust the means to inject light into one fiber of each pair of optical fibers and the response corresponding to the tip nearest the diaphragm provides an output corrected by the response of the tip furthest from the diaphragm.

27. The fuel injector of claim 26 wherein the means to inject light is adjusted to provide a substantially constant response from the tip furthest from the diaphragm.

28. The fuel injector of claim 25 including circuit means in opto-electronic communication with the at least one pressure sensor having two pairs of optical fibers, said circuit means including means to inject light into one fiber of each pair of optical fibers, means to detect light arriving from the other fiber of each pair of optical fibers and provide responses thereto, summing means to combine the responses and adjust the means to inject light into one fiber of each pair of optical fibers and differencing means to combine the responses to provide a corrected output.

29. The fuel injector of claim 28 including temperature sensing means mounted in the at least one pressure sensor,

and means in said circuit means adapted to respond to temperature induced changes in the temperature sensing means and in response thereto to adjust the corrected output.

30. The fuel injector of claim 26 including means to programmably calibrate the responses among a plurality of optical fiber pairs.

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